

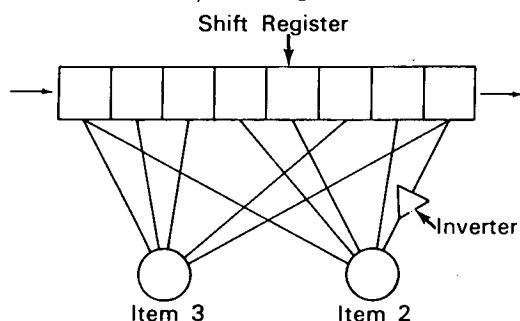
NASA TECH BRIEF



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Division, NASA, Code UT, Washington, D.C. 20546.

Improved Convolutional Coding

Convolutional coding, used to upgrade digital data transmission under adverse signal conditions, has been improved by a method which ensures data transitions, permitting bit synchronizer operation at lower signal levels. In this new technique, (1) if the input is a sequence-of-zeros, a sequence-of-zeros output is prevented by using an inverter to complement one of the signals, and (2) if the input is a sequence-of-ones, a sequence of either ones or zeros output is prevented by combining an odd number of signal bits for transmission, with rate-1/2 coding.



Representation of New Technique

When all input data bits are zero, the inverter (see fig.) inverts the signal, item-2 provides a "one" output, and the coded output becomes alternate ones and zeros.

If an odd number of signals is combined at Item-3, Item-2 produces ones. This occurs for an all-ones input and is the complement of the signal obtained with all-zeros. When all-zeros is changed to all-ones, Item-2 produces the complement. This occurs when an even number of signals is combined at the shift register, exclusive of the inverted signal.

The functions of Items 2 and 3 may be exchanged, with either arrangement producing a sequence of ones

and zeros for an input of all-zeros, and the complement for an input of all-ones.

With rate-1/3 coding, the system provides transitions; and, with a combination of an odd number of signals for the third element, the third signal is also inverted when the sequence is changed from ones to zeros.

Although, primarily, this method aids bit-synchronizer performance by using coded-data transmission, it also increases decoding ability by removing the ambiguous condition. In addition, certain types of data error may be corrected at the receiving point, eliminating the need for retransmission in order to correct the error.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
Manned Spacecraft Center, Code BM7
Houston, Texas 77058
Reference: B70-10698

Patent status:

Inquires about obtaining rights for the commercial use of this invention may be made to:

Patent Counsel
Mail Code AM
Manned Spacecraft Center
Houston, Texas 77058

Source: G. D. Doland of
Lockheed Electronics Co.
under contract to
Manned Spacecraft Center
(MSC-13625)

Category 09